

CLAIMS

1. A starter of single-phase induction motor having main winding and auxiliary winding energized by alternating-current power source, comprising:

5 a casing,

a positive characteristic thermistor connected in series to the auxiliary winding,

an auxiliary positive characteristic thermistor connected parallel to the positive characteristic thermistor,

10 a snap action bimetal connected in series to a series circuit of auxiliary winding and positive characteristic thermistor for sensing the heat from the auxiliary positive characteristic thermistor and turning off when reaching a set temperature, and

15 an enclosed compartment accommodated in the casing, for enclosing the snap action bimetal and auxiliary positive characteristic thermistor.

2. The starter of single-phase induction motor of claim 1, wherein the snap action bimetal is composed of a movable contact plate for oscillating a movable contact point, a bimetal, and
20 a plate spring of semicircular section interposed between first support point of the movable contact plate and second support point of the bimetal,

the movable contact plate is forced so as to cause the plate
25 spring to push the movable contact point to the fixed contact point side when the second support point is shifted to the leading end position side at low temperature of the bimetal, than the line segment linking the support point of the movable contact plate and the first support point, and

30 the movable contact plate is forced so as to cause the plate spring to depart the movable contact point from the fixed contact point side when the second support point is shifted to the leading end position side at high temperature of the bimetal, than the

line segment linking the support point of the movable contact plate and the first support point.

3. The starter of single-phase induction motor of claim 1, wherein the snap action bimetal is a bimetal processed by drawing.

4. The starter of single-phase induction motor of claim 1, wherein the snap action bimetal is a bimetal processed by forming in a circular form in the center.

5. A starter of single-phase induction motor having main winding and auxiliary winding energized by alternating-current power source, comprising:

a casing,

a positive characteristic thermistor connected in series to the auxiliary winding,

15 an auxiliary positive characteristic thermistor connected parallel to the positive characteristic thermistor,

a bimetal connected in series to a series circuit of auxiliary winding and positive characteristic thermistor for sensing the heat from the auxiliary positive characteristic thermistor and turning off when reaching a set temperature,

20 an enclosed compartment accommodated in the casing, for enclosing the bimetal and auxiliary positive characteristic thermistor, and

a magnet for applying magnetic force to the bimetal so as to force the contact point to the ON side.

6. The starter of single-phase induction motor of any one of claims 1 to 5, wherein the auxiliary positive characteristic thermistor is contacting with the base of the bimetal.

7. A starter of single-phase induction motor having main winding and auxiliary winding energized by alternating-current power source, comprising:

a casing,

a positive characteristic thermistor connected in series

to the auxiliary winding,

an auxiliary positive characteristic thermistor connected parallel to the positive characteristic thermistor,

5 a temperature sensing magnet for sensing the heat from the auxiliary positive characteristic thermistor and demagnetizing when reaching a set temperature,

a switch connected in series to a series circuit of auxiliary winding and positive characteristic thermistor, and turning on as being attracted by the magnetic force of the temperature sensing magnet, and turning off by demagnetization of the temperature sensing magnet, and

10 an enclosed compartment accommodated in the casing, for enclosing the switch.

8. A starter of single-phase induction motor having main winding and auxiliary winding energized by alternating-current power source, comprising:

a positive characteristic thermistor connected in series to the auxiliary winding,

20 an auxiliary positive characteristic thermistor connected parallel to the positive characteristic thermistor,

a temperature sensing magnet for sensing the heat from the auxiliary positive characteristic thermistor and demagnetizing when reaching a set temperature, and

25 a reed switch connected in series to a series circuit of auxiliary winding and positive characteristic thermistor, and turning on as being attracted by the magnetic force of the temperature sensing magnet, and turning off by demagnetization of the temperature sensing magnet.

9. The starter of single-phase induction motor of any one of claims 1 to 8, wherein a through-hole is pierced in a specified position of a conductor plate having a spring member for connecting electrically while holding the positive characteristic thermistor by elastic force, and a fuse is

provided by narrowing the width in the outer circumference of the through-hole.

10. The starter of single-phase induction motor of any one of claims 1 to 9, further comprising:

5 a conductor plate having a spring member for connecting electrically while holding the positive characteristic thermistor by elastic force,

wherein the spring member has a rectangular opening in each center of a pair of rectangular plate extending sideways, a pair
10 of U-sections face to face at the opening side are formed of a pair of parallel portions and linking portions for linking the parallel portions, and the pair of U-section are bent to the inner side to form U-section,

the leading end vicinity of the parallel portions is bent
15 and projected so that the linking positions may come to the inner side, and a contacting corner abutting against the positive characteristic thermistor is formed, and

a slot is formed parallel to the parallel portion in the contacting corner.

20 11. The starter of single-phase induction motor of any one of claims 1 to 9, further comprising:

a conductor plate having a spring member for connecting electrically while holding the positive characteristic thermistor by elastic force,

25 wherein the spring member has a rectangular opening in each center of a pair of rectangular plate extending sideways, a pair of U-sections face to face at the opening side are formed of a pair of parallel portions and linking portions for linking the parallel portions, and the pair of U-section are bent to the inner
30 side to form U-section,

the leading end vicinity of the parallel portions is bent and projected so that the linking positions may come to the inner side, and a contacting corner abutting against the positive

characteristic thermistor is formed, and

a notch is formed parallel to the parallel portion in the contacting corner.

12. A starter of single-phase induction motor having main
5 winding and auxiliary winding, comprising a positive
characteristic thermistor connected in series to the auxiliary
winding, and a socket terminal for connecting electrically with
a detachable connection pin,

wherein the socket terminal has a pair of plates extending
10 sideways in the axial direction of connection pin bent to the
inner side, has the leading end formed in an arc shape so as to
conform to the columnar shape of the connection pin, and is
provided with a connection pin holder having the leading ends
spaced from each other, and

15 the connection pin holder is divided into two sections by
the slit in the connection pin axial direction and vertical
direction, into leading end side first position, and inner side
second position.

13. The starter of single-phase induction motor of claim
20 12, wherein a recess for accommodating the leading end portion
of the connection pin penetrating through the connection pin
holder is provided in the casing for holding the socket terminal.

14. The starter of single-phase induction motor of claim
12 or 13, wherein the leading end side first position of the
25 connection pin holder is formed so as to hold the connection pin
more softly than the inner side second position.

15. The starter of single-phase induction motor of claim
12 or 14, wherein the leading end side first position of the
connection pin holder is formed so that the length in the
30 connection pin axial direction may be longer than the inner side
second position.

16. The starter of single-phase induction motor of claim
12 or 14, wherein the inner side second position of the connection

pin holder is formed so that the length in the connection pin axial direction may be longer than the leading end side first position.

17. The starter of single-phase induction motor of any one of claims 12 to 16, wherein a V-notch is cut in the leading end of the inner side second position of the connection pin holder, that is, at the leading end of the pair of plates.

18. A starter and an overload protective device of single-phase induction motor manufactured by assembling an overload protective device in a starter in any one of claims 12 to 17.

19. A starter of single-phase induction motor having main winding and auxiliary winding energized by alternating-current power source, comprising:

- 15 a casing,
- a positive characteristic thermistor connected in series to the auxiliary winding,
- an auxiliary positive characteristic thermistor connected parallel to the positive characteristic thermistor,
- 20 a slow action bimetal connected in series to a series circuit of auxiliary winding and positive characteristic thermistor for sensing the heat from the auxiliary positive characteristic thermistor and turning off when reaching a set temperature, and
- 25 an enclosed compartment accommodated in the casing, for enclosing the slow action bimetal and auxiliary positive characteristic thermistor.

20. The starter of single-phase induction motor of claim 19, wherein the auxiliary positive characteristic thermistor is contacting with the base of the slow action bimetal.

21. A starter of single-phase induction motor having main winding and auxiliary winding energized by alternating-current power source, comprising:

a positive characteristic thermistor connected in series to the auxiliary winding,

an auxiliary positive characteristic thermistor connected parallel to the positive characteristic thermistor,

5 a slow action bimetal connected in series to a series circuit of auxiliary winding and positive characteristic thermistor for sensing the heat from the auxiliary positive characteristic thermistor and turning off when reaching a set temperature, and

10 a snap action bimetal connected in series to a series circuit of auxiliary winding, positive characteristic thermistor, and slow action bimetal for sensing the heat from the positive characteristic thermistor and turning off when reaching a specified high temperature.

15 22. The starter of single-phase induction motor of claim 21, wherein the snap action bimetal is designed not to reset at ordinary temperature.

20 23. The starter of single-phase induction motor of claim 21 or 22, wherein the contact point of the slow action bimetal and contact point of the snap action bimetal directly contact with each other,

when the slow action bimetal reaches the set temperature, it is departed from the contact point at the snap action bimetal side, and

25 when the snap action bimetal reaches the specified high temperature, it is departed from the slow action bimetal side.

30 24. The starter of single-phase induction motor of claim 23, wherein a stopper is provided for contacting with the leading end of the snap action bimetal, so as not to disturb the operation of the slow action bimetal.

25. An enclosed motor using a starter in any one of claims 19 to 24.

26. An apparatus having an enclosed motor using a starter

in any one of claims 19 to 24.